

JADARA

Volume 20 | Number 1

Article 8

October 2019

A Comparison of the Leiter-International Performance Scale to WPPSI Performance with Preschool Deaf and Hearing Impaired Children

John Boyd
Robarts School, London England

Alvin H. Shapiro
Robarts School, London England

Follow this and additional works at: <https://repository.wcsu.edu/jadara>

Recommended Citation

Boyd, J., & Shapiro, A. H. (2019). A Comparison of the Leiter-International Performance Scale to WPPSI Performance with Preschool Deaf and Hearing Impaired Children. *JADARA*, 20(1). Retrieved from <https://repository.wcsu.edu/jadara/vol20/iss1/8>

A COMPARISON OF THE LEITER-INTERNATIONAL PERFORMANCE SCALE TO WPPSI PERFORMANCE WITH PRESCHOOL DEAF AND HEARING IMPAIRED CHILDREN

**John Boyd
and
Alvin H. Shapiro**
The Roberts School
London, England

While the Wechsler Preschool and Primary Scale of Intelligence (WPPSI) (Wechsler, 1967) is a well standardized test meeting the American Psychological Association test standards (APA, 1976), the Leiter International Performance Scale (LIPS) (Leiter, 1969) is neither well standardized nor does it conform to APA guidelines (Ratcliffe & Ratcliffe, 1979; Sattler, 1982; Vernon, 1976). Furthermore, the hearing-normed performance tests of the WPPSI have been shown as appropriate for deaf preschoolers (Ray & Ulissi, 1982), but no such information at these age levels is available on the LIPS. Deaf preschool test comparisons have been made between the LIPS and the deaf-normed Hiskey-Nebraska Test of Learning Aptitude (Birch & Birch, 1951; 1956; Hiskey, 1966; Mira, 1962). Only the Mira (1962) study, though, reported a between-test validity coefficient and it was .77 – a high value.

It is, however, not always possible to administer either the Hiskey or the WPPSI because of age range restrictions of these tests, lack of cultural exposure of the subjects, or lack of communication ability (signing or speech) by either the test administrator or the subject. The simple LIPS format makes it easy to administer (Matthew & Birch, 1949) and, despite its lack of validation at preschool levels, the instrument has been in heavy use in the testing of deaf children (Anderson & Stevens, 1970).

The LIPS has been compared to the age-advanced WISC-R (Wechsler, 1974) which is similar to the WPPSI. Older hearing impaired youngsters score similar IQs on the LIPS as they do on the WISC-R Performance section (Ritter, 1976; Levine, 1982), however, LIPS/WPPSI compatibility, or lack thereof, is still unknown.

Johnston (1982) criticized the LIPS as being too perceptually biased. It was her contention that, below eight years of age, the majority of

LIPS test items are of the spatial-matching variety. This can perhaps be contrasted with several more systematic conceptual-like tasks on the WPPSI such as Animal House or Mazes. In spite of the LIPS seemingly narrow concentration on perceptual skills, though, it has been proven to be an excellent long-term academic predictor. Aram, Ekelman & Nation (1984) studying preschoolers who had language disorders and who had been tested on the LIPS ten years earlier, reported the LIPS as the best single forecaster of later adolescent IQ, class placement, and reading. The LIPS was superior to nine other instruments used at nursery school age and these included several language measures.

Since the LIPS continues to demonstrate its credibility and is in wide use (Schery, 1985), we decided to compare the LIPS to WPPSI Performance in a preschool hearing-impaired group with moderate to profound hearing losses. The study was exploratory and our interest was to examine IQs between the tests as well as interrelationships among the tasks.

METHOD

Subjects and Procedure

The sample consisted of 11 boys and 9 girls ranging in age from 52 to 76 months (M 59.1, SD 6.51). They were all seeking admission to The Roberts School for the Hearing Handicapped. Pure tone hearing levels averaged 91.75 (SD 22.65 dB) for the right ear and 89.35 (SD 24.51 dB) for the left ear. The range for both ears was between 45 dB and 110 dB. By hearing loss category, 3 had moderate losses, 2 moderate-to-severe, 2 severe, 1 severe-to-profound, and 12 were profoundly deaf. Thirteen of the children were on a weekly Roberts home-visiting program in which a trained teacher of the deaf provided specialized home input for one and one-half hours. The remaining

A COMPARISON OF THE LEITER-INTERNATIONAL PERFORMANCE SCALE TO WPPSI PERFORMANCE WITH PRESCHOOL DEAF AND HEARING-IMPAIRED CHILDREN

subjects were either on alternate preschool programs or else had just moved into the metropolitan area. In all cases the hearing loss was the only primary handicap. The socioeconomic status was mixed.

Testing was done by the Roberts School psychologist according to a prearranged schedule, so that the order of administration of the LIPS and WPPSI Performance was random. All of the known testing conditions were kept constant between tests.

To make inter-subtest comparisons LIPS subtests were reduced according to categories

described by Levine, Allen, Alker & Fitzgibbon (1975) but with two changes. Quantitative Discrimination and Symbolic Transformation were grouped as *Symbolic Functions*. Spatial Imagery and Genus Matching were regrouped into *Spatial Relations*. These alternations were needed to compensate for very uneven item representation at these age levels in these categories. The result of regrouping were the four LIPS subtest categories listed in Table 1: Concretistics Matching, Symbolic Functions, Spatial Relations and Progression Discrimination.

TABLE 1
Regrouped LIPS Subtest Categories

	No. of Items	II	III	IV	Age V	VI	VII	VIII
Concretistics Matching	7	1,3,4 ^a	1,2	1,2				
Symbolic Functions	7		4	3,4	3	3	1,3	
Spatial Relations	8	2	3		1,2,4	4	4	2
Progression Discrimination	6					1,2	2,3	1,4

Note ^aArabic numerals in rows represent item numbers

RESULTS

Repeated measures MANOVA (Regents of University of California, 1981) conducted on the two IQ scores revealed a main effect for score $F(1,18) = 11.42, p < .003$ such that the average LIPS IQ (108.25, SD 16.52) was higher than that of the WPPSI Performance IQ (98.30, SD 13.56). No other IQ effects were significant, e.g., Sex or Preschool Program.

For interest's sake and clinical inspection

IQs, subtest means and standard deviations are recorded in Table 2. The LIPS values are in raw score form while WPPSI Performance results are in scaled scores. All subjects got all items of LIPS Concretistics Matching correct except for a single miss. No subject got more than two items correct in Progression Discrimination. All WPPSI scales seemed fine except for Animal House which had a low mean value.

TABLE 2
Means and Standard Deviations of LIPS IQ, Subtest Categories, and WPPSI IQ, Subtest Scale Scores

	LIPS					WPPSI					
	IQ	CM	SF	SR	PD	IQ	AH	PC	M	GD	BD
Mean	108.25	6.95	4.00	4.15	.80	98.30	8.10	9.66	10.80	10.71	9.57
SD	16.52	.22	1.62	1.69	.76	13.56	2.96	2.81	3.32	2.88	2.56

Note $n = 20$ in all cases

CM = Concretistics Matching, SF = Symbolic Functions, SR = Spatial Relations, PD = Progressive Discrimination, AH = Animal House, PC = Picture Completion, M = Mazes, GD = Geometric Design, BD = Block Design

Between subtest correlations are presented in Table 3. For inspection purposes we have included correlations taken from the WPPSI manual at the same average age level (Wechsler, 1967). The LIPS-WPPSI IQ correlation coefficient value of $.65, p < .001$ suggests that the same IQ construct is being measured.

This value is surpassed by the Spatial Relations/WPPSI IQ coefficient of $.70$ but it is not significantly different, i.e., $Z = .27$. Progression Discrimination within this age range is unreliable and while Animal House of the WPPSI significantly contributed to the WPPSI Performance IQ it seemed independent of all other subtests.

A COMPARISON OF THE LEITER-INTERNATIONAL PERFORMANCE SCALE TO WPPSI PERFORMANCE WITH PRESCHOOL DEAF AND HEARING-IMPAIRED CHILDREN

TABLE 3
Correlation Coefficients of I.Q.'s and Subtests for the Total Group

Test	WPPSI-IQ	LIPS-IQ	Concretistics Matching	Symbolic Functions	Spatial Relations	Progression Discrimination
Animal House	.52 (.58)	.13	.12	.07	.19	.00
Pic. Comp.	.53 (.56)	.58	.38	.44	.65	.28
Mazes	.78 (.58)	.49	.37	.52	.43	.11
Geo. Design	.78 (.66)	.48	.38	.53	.48	-.02
Bl. Design	.74 (.63)	.40	.44	.28	.42	.07
WPPSI-IQ		.65	.55	.58	.70	.07
LIPS-IQ			.67	.77	.72	.34

Note Values in parenthesis from p. 28 of WPPSI Manual (Weschler, 1969). A correlation of .44 or greater is significant at the .05 level (two-tailed).

DISCUSSION

An IQ obtained by the LIPS seems to be tapping into the same IQ dimension as that of WPPSI Performance. These results support an age downward extension of similar correlations noted between the WISC-R and LIPS IQs of older deaf and hearing impaired children (Ritter, 1976; Levine, 1982). It suggests that the LIPS is conceptually robust at young ages and is measuring what was intended.

The sample size of this study was small, but reliable (95% population IQ confidence limits ranged from .30 to .84). Certain results, moreover, stood out clearly and bear comment. Either the LIPS overestimates the IQ or else WPPSI Performance underestimates it. Ray & Ulissi (1982) have carried through extensive testing using the WPPSI with deaf preschoolers. Deaf youngster's IQs were found compatible with regular WPPSI Performance values. In view of this we can assume, for the time being, that the WPPSI Performance IQ of 98 was more accurate than that of the LIPS. Perhaps it would be prudent for clinicians to avoid adding the extra five IQ points to the raw IQ obtained on the LIPS at preschool ages. By not arbitrarily adding five IQ points as recommended by Leiter (1969, page 4) the unmodified LIPS IQ of 103 more closely matches that of the WPPSI and significant differences between the two IQ estimates disappear, i.e., $F(1,18) = 2.78$.

Two subtests of the LIPS and one of the WPPSI are weak with hearing-impaired pre-

schoolers. Of the LIPS, Progression Discrimination has most of its items clustering in the seven-to-eight year old range while, contrarily, all of the Concrete Matching items occur below the age of four.

In practice, very few preschoolers master the advanced Progression items while virtually all of them effortlessly complete the matching tasks. This study's classification based on Levine, et al (1975) is finer-grained than that of Johnston's (1982). It may allow further insight into which items of the LIPS may form a better base than the others for prediction. It seems as if the main mental exercises of the LIPS at this age are Symbolic Functions and Spatial Relations. This is the case both in terms of between subtest consistency as well as in contribution to joint WPPSI/LIPS IQs.

Animal House of the WPPSI is difficult to administer. Frequently, deaf preschoolers fail to grasp the task. Maybe it is because of this peculiarity that it does not correlate highly with LIPS measures. Alternatively, it may ultimately be shown to represent a unique IQ dimension which the LIPS does not assay.

In summary, the LIPS seems to be a suitable and concurrently valid instrument to use with deaf preschoolers. It probably slightly overestimates the IQ level, so caution is warranted. Some very early level LIPS tests are too easy and some later level ones too difficult. The latter problem is shared with the WPPSI Animal House subtest.

REFERENCES

- American Psychological Association (1976). Standards for educational and psychological tests. Washington D.C.: APA
- Anderson R. M. & Stevens, G.D. (1970). Policies and procedures for admission of mentally retarded deaf children to residential schools for the deaf. *American Annals of the Deaf*, 115, 30-36.

A COMPARISON OF THE LEITER-INTERNATIONAL PERFORMANCE SCALE TO WPPSI PERFORMANCE WITH PRESCHOOL DEAF AND HEARING-IMPAIRED CHILDREN

REFERENCES, Cont.

- Aram, D., Ekelman, B. & Nation, J. (1984). Preschoolers with language disorders: 10 years later. *Journal of Speech and Hearing Research*, 27, 232-244.
- Birch, J. R. & Birch, J. W. (1951). The Leiter International Performance Scale as an aid in the psychological study of deaf children. *American Annals of the Deaf*, 96, 502-511.
- Birch, J. R. & Birch, J. W. (1956). Predicting school achievement in young deaf children. *American Annals of the Deaf*, 101, 348-352.
- Hiskey, M. S. (1966). *Manual: Hiskey-Nebraska Test of Learning Aptitude*. Lincoln: Union College Press.
- Johnston, J. R. (1982). Interpreting the Leiter IQ: Performance profiles of young normal and language-disordered children. *Journal of Speech and Hearing Research*, 25, 291-296.
- Leiter, R. G. (1969). *General instructions for the Leiter International Performance Scale*. Chicago: Stoelting Company.
- Levine, M. N. (1982). *Leiter International Performance Scale: A handbook*. Los Angeles: Western Psychological Services.
- Levine, M. N., Allen, R. M., Alker, L. N. & Fitzgibbon, W. (1975). *Manual for clinical profile: Leiter International Performance Scale*. Chicago: Stoelting Company.
- Matthew, J. & Birch, J. W. (1949). The Leiter International Performance Scale – a suggested instrument for psychological testing of speech and hearing clinic cases. *Journal of Speech and Hearing Disorders*, 14, 318-321.
- Mira, M. P. (1962). The use of the Arthur Adaptation of the Leiter International Performance Scale and the Nebraska Test of Learning Aptitude with preschool deaf children. *American Annals of the Deaf*, 107, 224-228.
- Ray, S. & Ulissi, S. M. (1982). *An adaptation of the Wechsler Preschool and Primary Scale of Intelligence for deaf children*. Natchitoches, L. A.: Steven Ray Publishing.
- Regents of University of California (1981) *BMDP2V – Analysis of variance and covariance with repeated measures*. Los Angeles: University of California.
- Ratcliffe, K. J. & Ratcliffe, M. W. (1979). The Leiter Scales: A review of findings. *American Annals of the Deaf*, 124, 38-45.
- Ritter, D. R., (1976). Intellectual estimates of hearing-impaired children: A comparison of three measures. *Psychology in the Schools*, 13, 397-399.
- Sattler, J. M. (1982). *Assessment of children's intelligence and special abilities* (2nd ed.). Toronto: Allyn & Bacon.
- Schery, T. M. (1985). Correlates of language development in language-disordered children. *Journal of Speech and Hearing Disorders*, 50, 73-83.
- Vernon, M. (1976). Psychologic evaluation of hearing-impaired children. In L. L. Lloyd (Ed.), *Communication assessment and intervention strategies*. Baltimore: University Park Press.
- Wechsler, D. (1967). *Manual for the Wechsler Preschool and Primary Scale of Intelligence*. New York: The Psychological Corporation.
- Wechsler, D. (1974). *Wechsler Intelligence Scale for Children* (rev. ed.). New York: The Psychological Corporation.